

**AN ASSESSMENT OF WELFARE STATUS OF ZERO-GRAZED DAIRY COWS IN
NAKURU TOWN EAST CONSTITUENCY, NAKURU COUNTY.**

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**A project submitted in partial fulfillment of the requirements for the award of the
degree of Bachelor of Veterinary Medicine, University of Nairobi.**

Faculty of Veterinary Medicine

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DECLARATION

I hereby declare that this project is my original work and has never been submitted to any other university or institution of higher learning for the award of any degree.

SIGN.....DATE.....

KARANJA BENARD WAWERU

This project has been submitted with my approval as the university of Nairobi supervisor.

SIGN.....DATE.....

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LIST OF ABBREVIATIONS

KBS : Kenya Bureau of Statistics

ABSTRACT

Animal welfare is defined as the ability of an animal to interact or cope comfortably with its environment, resulting in satisfaction of both its physical and mental state. This satisfaction enhances expression of normal behavioral patterns by the animal. This study was carried out with the objectives of establishing the welfare status of zero-grazed dairy cows in Nakuru East constituency in Nakuru county by evaluating the most violated freedom, determining the awareness of animal welfare among the owners of zero grazed dairy cows and to give recommendations on how to raise zero-grazed dairy cows without abusing their welfare after establishing the status. This was a cross-sectional study carried out by administering semi-structured questionnaires covering aspects of zero-grazed dairy cows welfare to owners of the dairy cows in Nakuru Town East constituency which has five wards. In the five wards under study 12 farmers from each ward were chosen and the whole study involved 60 dairy farmers. Some observations were made on the design of zero-grazing unit structures, feeding, watering, disease control and breeding practices undertaken by the dairy farmers. The study established that Zero-grazed cows nutrition in general was good except for a few with poor nutrition as indicated by body scores. Some of the dairy cows were not provided with overhead shelter but slept outside exposed to extremes of weather with the sleeping places having slurry and varied levels of hygiene. It was also established that the dairy farmers had very little knowledge regarding animal welfare and wellbeing in general with 17 farmers, 28.33% aware of animal welfare and the rest 71.67% had very little knowledge. The health challenges facing zero-grazed dairy included: pneumonia 2%, East coast fever 20%, mastitis 25%, lameness 10%, footrot 18%, helminthosis 6% and fly nuisance 100%. This study concludes that poor awareness of animal welfare amongst farmers in these zero-grazed dairy

cattle in the smallholder dairy units of the Nakuru town East constituency has directly resulted to poor cattle welfare.

CHAPTER 1: INTRODUCTION

The increase population in developing countries has led to scarcity of land resources therefore most dairy cows are raised in small holder farms (zero- grazing units). Despite their tremendous contribution to food security and creating of employment, little emphasis is put to their welfare status. This is either due to land scarcity, lack of knowledge or due to economic status of the dairy farmers leading to neglect.

In general there is an increased focus on animal welfare in dairy farms, and it is expected that animal welfare will be an important aspect to public acceptance of modern dairy production systems. Furthermore, experiences from previous studies indicate that there is a large variation between herds in general, regarding animal welfare, due to the effect of interactions between production system and management (Sandoe *et al.*, 1997).

To answer the question of whether intensive dairy production is compatible with animal welfare, there is need to consider the welfare concerns not only from the perspective of the producer, but also from that of the general public and, even more importantly, the animal itself. In fact, several scientists suggest that the very important key to understanding acceptable animal welfare lies in understanding the animal's viewpoint and its "feelings" about its environment or conditions in which it lives (Duncan and Petherick 1989; Webster *et al.*, 1993). Some have argued that welfare is not compromised unless the animal physiologically or psychologically feels that its welfare is compromised. With this in mind it is worth discussing what the dairy animal may feel about its environment under intensive systems (Stookey *et al.*, 1994)

However for effective integration of animal welfare in production of zero-grazed dairy cows, there is need to assess the welfare status of zero-grazed dairy cows in different areas of this

country as a lot of dairy cows are subjected to production systems that are not friendly to their welfare status of dairy animals.

1.1 Objectives of the study

- I. To determine the welfare status of zero-grazed dairy cattle in Nakuru Town East constituency.
- II. To determine the awareness of animal welfare among the owners of zero grazed dairy cows in Nakuru Town East constituency.
- III. To evaluate the most violated freedom in zero grazed dairy cows in Nakuru East Town constituency.

1.2 Justification

The welfare status of zero-grazed dairy cows in Kenya is of major concern owing to the reduced land sizes and increased human population. For many years the dairy industry has changed tremendously due to its economic importance and its contribution to food security. Despite this the welfare of zero-grazed dairy cows has been neglected by farmers. The negligence of zero-grazed dairy cows welfare in Kenya is as a result of high levels of intensification, intentional physical injury, lack of adequate space, under feeding and lack of proper housing and feeding facilities. The situation exists due to lack of livestock extension services to farmers and the few services to farmers do not educate them on issues of the welfare of dairy cows and the best production practices that do not violate animal welfare.

This study therefore intended to establish the current welfare status of zero-grazed dairy cows in Nakuru town East constituency in Nakuru county and in the process, establish reasons for poor welfare status of dairy animals. Findings from this study are expected to make contribution towards improvement of welfare of zero-grazed dairy cows by teaching farmers on how to raise dairy animals in a humane way through improving the housing facilities, proper feeding and handling of animals.

CHAPTER 2: LITERATURE REVIEW

2.1 Status of zero-grazed dairy cows in Kenya (general)

The small holder zero-grazing dairy units contribute about 80 % of the national commercial dairy herd and over 70% of all marketed milk in Kenya according to (KNBS, 2009) .The cows in zero grazed units have sub- optimal milk production which is attributed to several constraints such as inadequate feeding, poor nutrition, sub-standard animal husbandry, lack of proper dairy farming facilities that include inadequate space to move and interact freely. All these factors in indoor housing have adverse effects on the welfare of dairy cattle (Nguhiu *et al .*, 2013).The rapidly growing human population in Kenya has caused intensification of dairy animal production technologies and industries to meet food demands and ensure food security. This has been accompanied in some cases by not only increasing challenges to the farmed animals but also conflicts and choices between animal welfare and productivity (Mogoa *et al.*, 2010). Zero-grazed dairy animal welfare in Kenya is of concern because little information is available to farmers since it is a new study.

Zero-grazing dairy production is an inevitable practice owing to the reduced land sizes, hence the importance of assessing the poor welfare existing in these zero –grazing systems in order to introduce corrective measures particularly in relation to designing of construction of welfare acceptable and cow comfortable zero- grazing units no matter how simple or cheap (Nguhiu *et al.*, 2013)

2.2 Freedom bestowed on animals

Welfare of an individual is its state as its attempts to cope with its environment (Broom *et al*, 1986). Animal welfare can be assessed using the five freedoms bestowed upon animals (Broom *et al*,1986). These freedoms are: Freedom from hunger and thirst that is catered for through provision of fresh water and a diet to maintain good health and vigor, freedom from thermal or physical distress by providing an appropriate environment including shelter and a comfortable resting area, freedom from injury, pain and disease through prevention or rapid diagnosis and treatment, freedom from fear and distress through provision of conditions that

avoid mental suffering and freedom to express most normal behavior patterns-availed through provision of sufficient space, proper facilities and company of the animals own kind (Broom *et al*, 1986).

Animal welfare is the physical and psychological wellbeing of animals as encompassed in five freedoms of animals. Abuse of any of these freedoms means compromised welfare. The five freedoms act as a checklist to enable us identify situations which compromise good animal welfare and hence causing them fear, pain, discomfort, injury, disease or behavioral distress(Edwards, 2004; Mogoia *et al.*, 2005).

2.3 Welfare indicators in assessment of animal welfare status

A welfare assessment system consists of a range of welfare indicators. A welfare indicator suitable for inclusion in an operational welfare assessment system should have the following qualities: A basis in scientific knowledge, the ability to reflect development over time, realistic measurability on the type of farm in question and the capability to offer decision support to the farmer. Aggregating welfare indicators into a welfare assessment protocol calls for a systematic procedure, which is described (Rousing *et al.*2001). Selection of an indicator depends on whether information is already routinely available or the information can be obtained as a supplement to ordinary consultations by the veterinarians or husbandry advisors. This third step regards developing methods and tests for use on farms (Rousing *et al.* (2001)

A protocol describing a full set of indicators for assessing animal welfare on an AMS-dairy farm was developed (Hindhede *et al.* (2002). Each indicator is described in terms of independent value, marginal value and suitability for on-farm use. The protocol documents the current measures included in a welfare assessment system. It is also a research tool for developing operational assessment systems with different resource demands. Behavior measurements are included in the operational welfare assessment system. The behavior

performed by the animals in the housing systems is compared to known descriptions of normal behavior patterns (Hindhede *et al.* ,2002).

Disease can be regarded as an important welfare indicator, because it is in many cases associated with negative experiences such as pain, discomfort or distress. The disorders, which have the greatest impact on welfare, are either acute disease processes, causing suffering or long-term progressive conditions involving chronic pain. One indicator in a welfare assessment, at farm level, may be the prevalence and intensity of certain health problems in the herd. A protocol for systematic clinical examination is developed, focusing on important welfare aspects. As a supplement to these important indicators for disease, incidence and death are included. Welfare indicators based on regular clinical examinations are measured 4 times a year focusing on: hoof and leg disorders, lameness, skin lesions, udder infections, body condition, and clinical diseases (Hindhede *et al.* 2002).

2.4 Some welfare issues facing the dairy industry

2.4.1. Housing of dairy animals

From a cow's perspective there are two major differences which exist between living in a single cubicle versus a free stall housing system. Cows in a free house stall have 1) greater freedom for movement and exercise, and 2) more opportunity for social interactions. Intensive dairy operations routinely adopt the free stall system not necessarily to improve animal welfare, but primarily to reduce labour. Indirectly, the cow benefits from the freedom of movement and the exercise (Stookey *et al.* 1994). Dairy housing should provide the animal with protection from harsh extremes in the environment (Hristov *et al.*, 2008). Good housing systems are those that are well designed for ease of management and maintenance at all times (DEFRA 2003; Webster 2005; Hristov *et al.*, 2008). It is proposed that all confinement facilities for animals should be constructed and operated to meet the legal requirements for

protection of the animal as well as maintain high quality animal products (Leaver *et al.*, 1999). Good animal housing systems are those that enhance provision of all the five freedoms that an animal should have to satisfy its welfare (FAWC 1993; DEFRA, 2003). If these basic needs cannot be met in the animal house, then health, welfare and production of the animal will be compromised. Skin lesions, other body injuries and swellings reflect the impact of the surrounding environment on the animal's body (Wechsler *et al.*, 2000). This affects the well-being of the animal by causing pain and discomfort thus infringing on the freedom of animal welfare.

2.4.2 Feeding of dairy cows

The good performance in production of milk involves energy expenditure which in turn necessitates additional dietary energy intake; nutrient digestion and energy release in tissues as facilitated by a supply of essential nutrients. Accordingly, feed intake and digestion are critical to work function (Weston *et al.* 1973). In most cases, animals are far below their genetic potential for size and productivity because of poor feeding. Providing more and better feed is the most important factor in increasing productivity of dairy animals (Weston *et al.*, 1973).

2.4.3 Handling of dairy animals

According to Grandin *et al.* (1985), rough handling of farm animals is not only inhumane but can cause excessive losses due to sickness and slower growth. Careful husbandry and handling of livestock in all phases of production are a prerequisite to a profitable business (Curtis *et al.*, 1988). Punishment must be very closely paired in time with the misbehavior if an animal is to learn appropriately. Punishment during milking, feeding and restraining should be in such limited forms that cruelty is not practiced. Behavior is typically shaped by initially rewarding the generic action and subsequently presenting the reward only on the production of more specific actions (Broom *et al.*, 1988). Knowledge of normal behavior patterns with perceptions provides an understanding about cattle and results in improved management that will achieve and maintain high yields (Broom *et al.*, 1985)

2.4.4 Animal health and disease management of dairy animals

The health of the animal is central to welfare of that animal. Maintenance of health in production animals differs from other domesticated species used for other purposes in that they are subject to a high production stress. Due to production stress, risk of illness is greater in dairy hence the need to keep an eye on their health to reduce the risk. Most dairy cows suffer from chronic and minor production disease conditions that are hardly noticed by farmers. Dairy animals are more susceptible to diseases and their high energy requirements for milk production makes them more sensitive to disease. Therefore, improved curative veterinary services are needed (Hindhede *et al.* 2002).

2.4.5 Dehorning

There is no dispute that the potential injury to the cattle and to ourselves favours the removal of horns. The controversy arises on how and when to dehorn. The most "welfare friendly" solution would be to use polled sires. It would eliminate the questions of how and when to dehorn and it would cause the least amount of pain to the animal. Unfortunately, polled sires are not readily available. Furthermore, dairy bulls carrying the polled gene lag behind horned sires in production traits. (Stookey *et al.*,1994)

However, according a study done by (Fox *et al.* ,1983)dairy calves dehorned at 8 weeks of age did not differ in gain from their horned counterparts by 12 weeks of age. It is difficult to measure if pain is less on younger animals, but the time to heal is certainly quicker. All evidence indicates that the procedures are less stressful to the animal, the younger it is at the time of application. He recommended dehorning within the first week following birth. Producers should adopt a dehorning technique which they are comfortable and successful at performing and avoid any technique which requires repeat application or additional attention. The use of local anesthetics when dehorning calves has previously been recommended as an acceptable means of improving animal welfare (Fox *et al.*, 1983).

2.4.6 Calf management

Under natural conditions a cow would bond to her calf immediately after parturition. She would provide maternal care and allow the calf to suckle up until weaning age, which occurs naturally at about 250 days of age. But it is a common practice among the small holder dairy farmers to separate the calf and dam immediately after parturition this infringes on the welfare of the calf and dam to express their natural behavior. Two separate studies suggest that the cow and calf should be allowed some period of time together (not greater than 24 hours) for some important physiological benefits (Albright *et al.*, 1983). Colostrum (even when hand fed) is more readily absorbed by a newborn calf in the presence of the cow and uptake is facilitated by the stimulation received through grooming and licking. The incidence of retained foetal membranes is reduced in cows where sucking by the calf was allowed (Albright *et al.*, 1983). It is a common practice among dairy producers to train calves to drink from a bucket instead of letting them suck the milk through an artificial teat. From the producers perspective the practice saves time and money because the calves can consume the milk more quickly. If calves are taught to drink milk from a bucket it may be an improvement in welfare to attach an artificial teat to the side of the pen for the calf to use after feeding (Anne Marie de Passille *et al.*, 1991)

2.5 Effects of housing facilities on welfare

There are clearly many aspects of the cow's housing and management systems that can affect her welfare. Lactating dairy cows expend a lot of energy producing milk, so providing them with a comfortable place to rest is vital to production and welfare. If a housing system is to be successful, it must provide for the spatial and behavioural needs of the cow. To achieve this, it is important to understand how an animal behaves when performing routine activities such as drinking, feeding, lying, rising and walking (Nguhiu *et al.* , 2013).

The design of the system and the level of management applied to the system, can affect the health and welfare of the cows. The cleanliness of the housing and animals can have an impact on both lameness and mastitis. Irrespective of the production system selected, to maximize performance of the herd, the accommodation must fully provide the cow's needs. At a minimum, it must provide a comfortable, well drained lying area, shelter from adverse weather and space to allow the animal to move freely around without undue risk of injury.

(Nguhiu *et al.* , 2013).

CHAPTER 3: MATERIALS AND METHODS

3.1 Location of the study

This study was carried out in Nakuru Town East constituency. Nakuru town east constituency has a total area of 74.30km² with a population of 157,167 people (Human population census KBS, 2009). Residents of this constituency are involved in zero-grazed Dairy farming and commercial rental houses. Most farmers keep pure dairy animals in a zero grazing system but a few have crosses. Long rains season is between March and May while the short rains season is between October and November. During the maize harvesting season, farmers collect the maize stalk to feed their animals with and store surplus for the dry season.

3.2 Target population and study design

This was a prospective study aimed at establishing the welfare status of zero-grazed dairy cows in Nakuru town East Constituency. The study focused on establishing the following information about zero-grazed animals: their nutrition, method of insemination, quality of animal housing and disease management practices.

3.3 Data collection

The data collection instruments were designed, pre-tested and revised. A total of sixty (60) farmers were involved in this study. About 12 farmers from each of the 5 wards (Biashara, Kivumbi, Flamingo, Menengai and Nakuru East) of the constituency were considered for the study. The researcher then paid actual visit by administering a semi-structured questionnaire and carrying out an in-depth interview of zero-grazed dairy farmers. The researcher also made own observations on activities that dairy animals were involved in such as milking, feeding, watering and general dairy management. Most data were collected in the morning when milking was done, mid-day when feeding and watering and in the evening when they were milked and later in the bomas where they slept. Some farmers were also unable to write and hence the researcher interviewed them and wrote down their responses.

3.4 Data management

The collected data were used to generate descriptive statistics where appropriate. Other data were used to calculate outcomes as a percentage of the total number of farmers interviewed. These were then used to construct graphs representing various outcomes of the study. Statistical graphs and percentiles were used to present data to provide meaningful information.

CHAPTER 4: RESULTS

4.1 General observations

The dairy cows in the area of study were in various body condition: 30(50%) were in good body condition, 20 (33.3%) had fair body condition while 10(16.67%) had poor body condition. A number of lameness were seen and 5(8.3%) animals had severe lameness, while 15 (25%) had mild lameness. There were around 50(83.3%) cases of cows with overgrown hooves, 5(8.3%) with sprayed toes and 10(16.7%) had claw deformities. Among the 60 farmers only 18(30%) farmers had proper housing facilities and the rest had very poor structures. Different methods were used by farmers to drive animals to the milking shed and included calling names (100%), whistling (50%), shouting (66.7%) and whipping (30%).

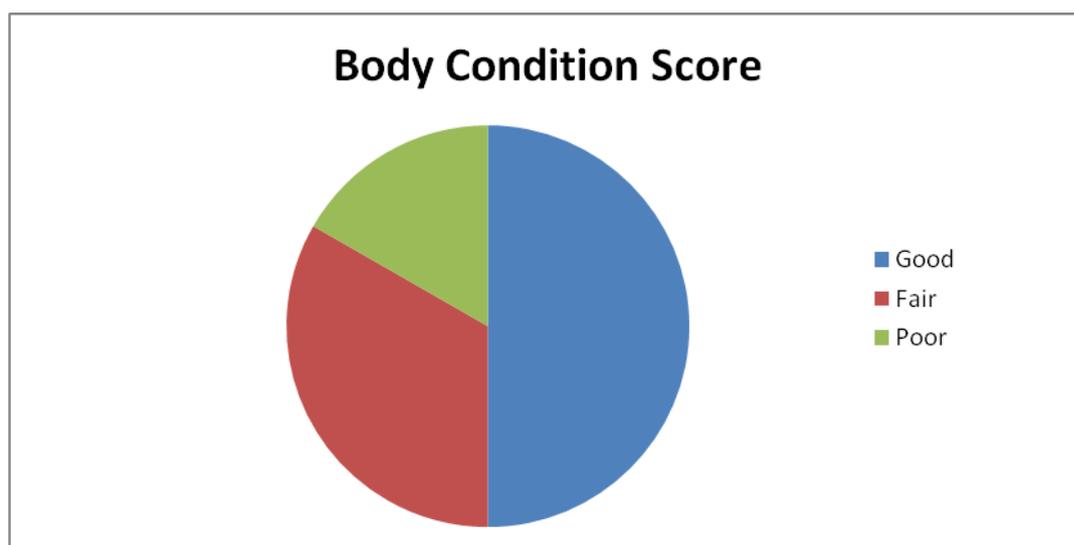


Figure 1: Body condition score of dairy animals in Nakuru East Constituency

4.2 Watering

Some farmers used watering troughs (42; 70%), other (18;30%) used small water tanks or buckets. The water was mainly from piped chlorinated water. Most farmers provided water at all times.

4.3 Housing

Only (16, 26.7%) farmers had proper housing for their animals. Forty four (73.33%) of the farmers had their animals sleeping in open yard which was filled with cow dung. Some tied their animals on a pole or tree.

4.4 Floor Type

Most animals had no beddings and their animals either slept on concrete floors (29,48.33%), arranged building blocks (7, 11.67%) or soiled ground floors (9, 15%). Only (18, 30%) farmers had mattresses for their dairy cows.

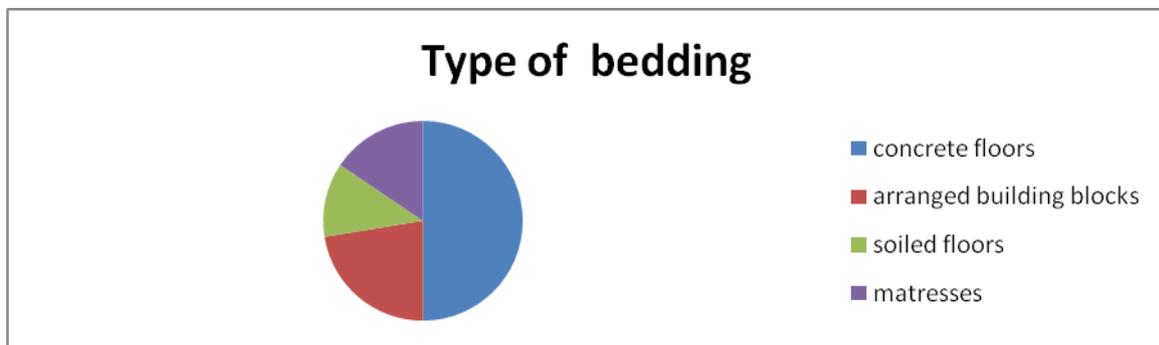


Figure 2: Type of bedding of dairy cows in Nakuru Town East Constituency

4.5 Drainage of the Boma

Of the 60 homesteads visited only (13,22%) bomas were well drained. Others, (20,33%) had moderately well drained, (27, 45%) very poor levels of hygiene as the dung was not collected on daily basis making the situation worse especially during the rainy season.

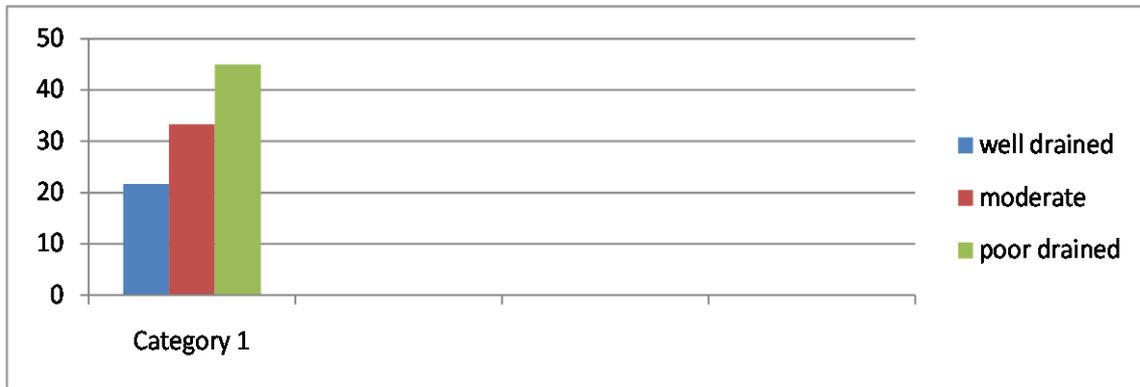


Figure 3: Drainage of the dairy cow bomas in Nakuru Town Constituency

4.6 Animal nutrition

Of the farmers interviewed in the study area (45, 75%) reported that they fed their animals mostly from napier grass or hay or potato peelings or banana peelings from the market or harvested maize stalks or cut grass, while (15, 25%) fed their dairy cows on only concentrates. Most farmers interviewed fed their animals mostly in the morning after milking and in the evening before and during milking. Most farmers provided their animals with mineral salt lick at all times with a few mixing mineral salt with concentrate only during milking.

4.7 Method of insemination

Around (57, 95%) farmers used artificial insemination as their method of mating their dairy cows while (3, 5%) used bulls they kept or from neighbours.

4.8 Farmers awareness of the five freedoms of animal welfare

The awareness was as follows : (17,28.33%) were aware of all the five freedoms, (21, 35%) were only aware with only 1 or 2 freedoms while (22,36.67%) of the farmers were either not aware or not familiar with any of the five freedoms with most saying that those freedoms only applied to human beings and not dairy animals.

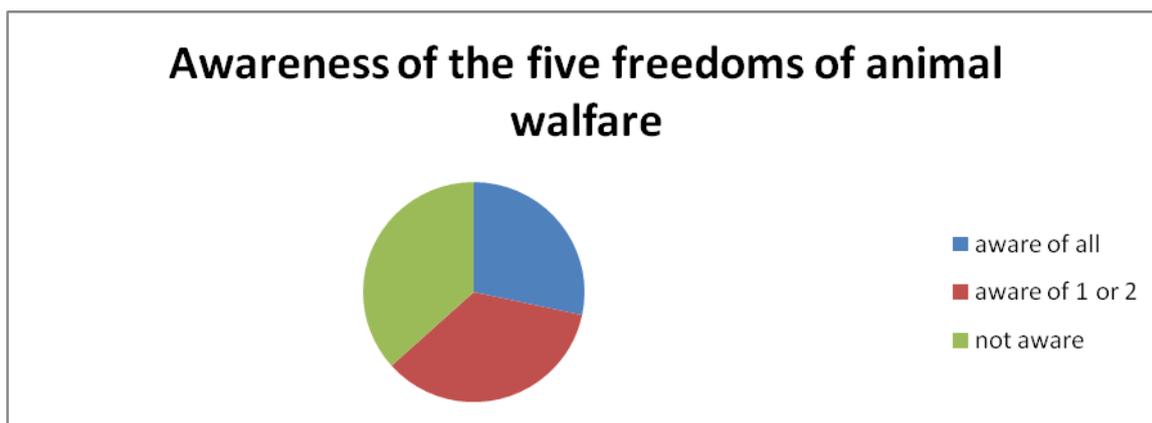


Figure 4: Awareness of the 5 freedoms of animal welfare in Nakuru Town East constituency

4.9 Animal health

Farmers interviewed in this study indicated that the challenges faced by dairy cows were mastitis(25%) , footrot (18%), lameness (10%), pneumonia (2%), helminthosis (6%), East coast fever (20%) and fly nuisance (100%). These farmers reported that animal health assistants and some veterinarians were the ones that treated sick cases. However animals observed suffered from chronic cases of mastitis, foot rot, ECF and lameness. Around 55 of farmers interviewed said they dewormed their animals after every 3 months while the rest did not bother to do so at all.

In the study area (45, 75%) farmers interviewed reported that they vaccinated the animals routinely against foot and mouth disease, lumpy skin, anthrax and black quarter. With (50,83.33%) of the farmers interviewed reported they sprayed their animals two times a week against ectoparasites and only (10,16%) sprayed once a week.

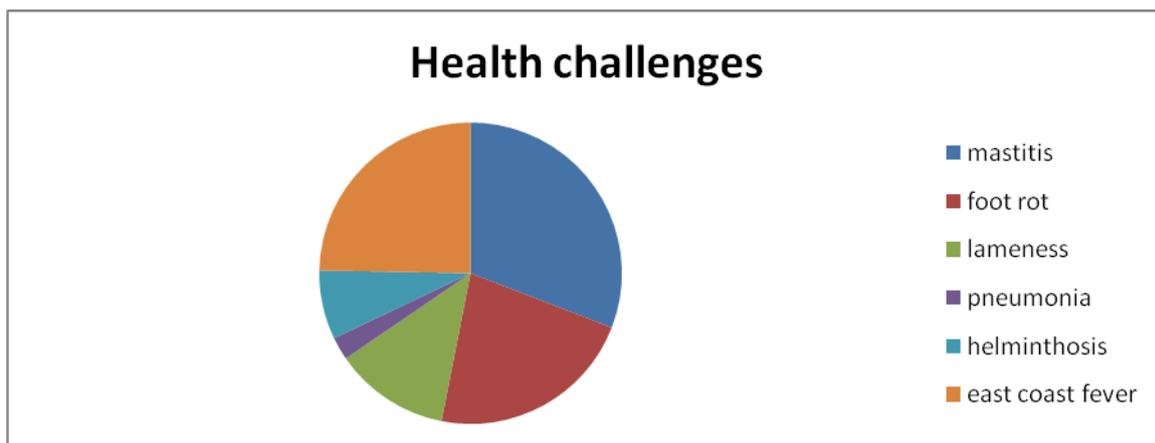


Figure 5: Health challenges in zero-grazed dairy cows in Nakuru East Town Constituency

4.10 Method of feeding calves

During the study most farmers left the calves to suckle colostrums after parturition and later the calves are isolated from the dam and trained to drink from a bucket instead of letting them suck the milk from the dam. Thirty six (60%) of the farmers gave their calves milk 1.5 liters in the morning and 1 litre in the evening while 24(40%) gave 1 liter in the morning and 1 liter in the evening. Most farmers started to replace milk as early as 1 month after birth especially if the calf is male with some even slaughtering the males to avoid giving them milk.

4.11 Separation of the calf and the dam

About Hundred percent of the dairy farmers interviewed during the study separated the calves 24 hours after parturition then the calves were housed in separate stall from the mother with no future contact with the mother.

CHAPTER 5: DISCUSSION

It was observed that the floor type which had rough surface with the arranged building blocks and accumulated slurry especially in the sleeping area led to prolonged standing. This caused the cows to use more energy and expose hooves to longer periods on slurry, which may have increased incidence of lameness. This is one of the violation of the freedom from pain and injury which is similarly reported by Nguhiu *et al.*, 2013).

Inadequate feeding space per animal at the feed troughs was a common finding during this study in zero-grazing dairy cattle houses. This led to increased competition and aggressive behavior of the cows toward each other and particularly towards the younger and weak cows during feeding times. These behaviors were the likely causes of physical injuries in the various regions of the body, and also led to reduced feeding time, factsthat violates the freedoms from hunger and also from pain and physical injury (some of the five freedoms of animal welfare). This supports studies done by Rousing and Sorensen(2000) and Nguhiu *et al.*, (2013).

During the study it was found out that 97% of the dairy farmers used artificial insemination as their preferred method of mating due to its many advantages over natural mating using a bull. This fact infringes on the freedom of expressing their natural behaviors (one of the five freedoms of animal welfare). It is expected as a natural behavior for cattle to mate naturally without any interference. However this is not the case in modern dairy farming which advocates for A.I as the preferred method of mating.

About 100% of the dairy farmers interviewed during the study separated the calves after a few hours after parturition after which the calves were housed in separate stall from the mother. Under natural conditions a cow would bond to her calf immediately after parturition. She would provide maternal care and allow the calf to suckle up until weaning age, which occurs naturally at about 250 days of age (Albright, 1983) In this systems farmers impose a

weaning age which deviates substantially from the naturally occurring weaning age. It was therefore established that most farmers separated the calves only a few hours from the dams which infringed on the natural behavior which is one of the five freedoms of animal welfare.

In the study there were reported cases of various health challenges among them pneumonia in calves probably due to sleeping in chilly conditions, foot rot, lameness, mastitis, East coast fever and Babesiosis due to lack of spraying by some farmers and fly nuisance due to uncollected manure. The health conditions were mainly dealt with by animal private and government veterinarian and health technicians. These challenges denied the animals their freedom from pain, injury and disease. (Edwards(2004) and Mogoia *et al.* ,2005) where the five freedoms act as a checklist to identify situations which compromise good animal welfare by causing fear ,pain , discomfort , injury , disease or behavioral distress. And also support a similar study that states that dairy animals are more susceptible to diseases and their high energy requirements for milk production makes them more sensitive to disease. Therefore, improved curative veterinary services are needed (Hindhede *et al.*,2002).

Majority of the zero-grazed cows were in good body condition which was a reflection of good feeding with a few in fair body condition and some in poor body condition where ribs and other bony prominences were well pronounced. This meant a few of the dairy cows were not well fed and therefore the freedom from hunger and thirst was infringed (Nguhiu *et al.*, 2013) It reflects mainly on the feeding regime, nutritional value of the diet and the feed quantities supplied to the cows.

The farmers and herdsman were found to have poor human-animal interaction, as depicted by shouting and whipping of the cows particularly during milking times. Such interactions caused fear that made the cattle aggressive, leading to agonistic behavior towards them. This made it difficult to handle them which is contrary to good animal welfare recommendations.

Nevertheless, the few farmers who supported the need for alleviation of animal pain and suffering as well as provision for animal comfort were found to be better informed on other animal welfare factors that also contribute to the improvement of production. This was similar to studies done by Nguhiu and Aleri (2013) that found out there is a variation on the knowledge of animal welfare amongst dairy farmers which contributed to poor production.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This study concluded that most farmers are not aware of the five freedoms of animal welfare and this has an effect on the productivity of their zero-grazed dairy cows. This study also concludes that poor cattle housing designs and the actual quality within the housings may have caused various disease conditions in these zero-grazed dairy cattle in Nakuru Town East Constituency with the effects resulting in poor animal welfare. There is a lack of extension services on issues to do with the production of zero-grazed cows in an animal welfare friendly status in Nakuru Town East Constituency.

6.2 Recommendations

This study recommends the following:

1. The government should provide extension workers to educate the dairy farmers on issues of animal welfare
2. All health challenges can be prevented and the farmers should observe good husbandry practices such as regular vaccinations against endemic diseases in the region, tick control through regular spraying with acaricide, regular drenching with appropriate anthelmintics and instituting a proper mastitis programme through herd health.
3. Health records should also be kept by farmers for ease of health management programme.

REFERENCES

- Albright, J. L.** (1983) . Effects of separation of calf and dam after birth on animal welfare. *Applied animal behavioral science. Journal of Dairy Science.* 66:2208-22-23
- Aleri, J.W., Nguhiu, J.M and Mogo, E.G.M (2011)** Housing-design as a predisposing factor for injuries and poor welfare in cattle within smallholder units in periurban areas of Nairobi, Kenya. *Livestock research for rural development* 23
- Broom D. M and Johnston, K.G (2000)**, *Stress and Animal Welfare.* Kluwer Dordrecht, Netherlands.
- Broom, D.M (1986)**: indicators of poor welfare. *British veterinary journal* 142,524-526.
- Broom, D. M. (1988)**, Relationship between welfare and disease susceptibility in farm animals. In: Gibson, T.E (ed.) *Animal disease-a welfare problem.* British veterinary Association. Animal welfare foundation, London, pp 20-29.
- DEFRA Department of the Environment, Food and Rural Affairs 2003.** Code of Recommendations for the Welfare of Livestock: Cattle. Defra Publications, London.
- De Passille, A.M.B., R.J. Christopherson and J. Rushen. (1991)** Sucking behaviour affects the post-prandial secretion of digestive hormones in the calf. *Proceedings of International Congress Society for Veterinary Ethology.* Edinburgh, Scotland. Universities Federation for Animal Welfare, Potter's Bar, Herts, Great Britain, pp. 130-131.
- Duncan, I. J.H. and Petherick J.C (1989).**Animal welfare and its definition. *Applied Animal Behavioural Science* 24-81.
- Edwards, D.J. (2004)**: The role of the veterinarian in animal-a global perspective. *Proceedings of the Global Conference on Animal welfare, an OIE Initiative, Paris, 23-25 February 2004,* pp27-32.
- FAWC Farm Animal Welfare Council 1993.** Second Report on Priorities for Research and Development in Farm Animal Welfare. DEFRA, London.
- Fox, M. W. (1983).** Issues of animal welfare in practice. *Journal of Dairy Science.* 66:2221-2225.
- Grandin T. (1985)** *Livestock handling,* third edition. chapter 3 p 100-137
- Hindhede, J., Rousing, T, Fossing, C & Sørensen, J.T. 2002.** A protocol for assessing animal welfare in an automatic milking system. Deliverables No. 23 in the EU-project: Implication of the introduction of automatic milking on dairy farms. (in press)
- Hristov S, Stankovic B, Zlatanovic Z, Joksimovic M Tand Davidovic V 2008.** Rearing conditions, health and welfare of dairy cows. *Biotechnology in Animal Husbandry* 24 (1-2): 25-35.

Leaver J.D (1999). Dairy cattle. In: Ewbank, R., Kim-Madslien, F., and hart, C.B. (editors), Management and Welfare of Farm Animals, 4th edition. The UFAW Handbook. Universities Federation for Animal Welfare, Wheathampstead, UK, pp 17-47.

(KNBS, 2009) Kenya national bureau of statistics. *Human population census*.

Mogoa E.G.M., Wabacha, J.K., Mbithi, P.M.F and Kiama, S.G (2005): An Overview of Animal Welfare Issues in Kenya. *The Kenya Veterinarian (29)*, 48-52

Mogoa E.G and Aleri J. W (2010): Entrenching animal welfare in policy and legislation frame works: Is Africa ready?

Nguhiu, J.M., Aleri, J.W., Mogoa, E.G.M and Mbithi, P.M.F (2013) Indicators of Poor Welfare in Dairy Cows Within Smallholder Zero-Grazing Units in the Peri-Urban Areas of Nairobi, Kenya. *Insight from veterinary medicine* Chapter 3 .

Rousing, T., Bonde, M. & Sørensen, J.T. 2000. Indicators for the assessment of animal welfare in a dairy cattle herd with a cubicle housing system. In: Improving health and welfare in animal production (ed. Blokhuis, H.J., Ekel E.D. & Wechsler, B.) EAAP publication No 102, 37-44

Rousing, T., Bonde, M. & Sørensen, J.T. 2001. Aggregating welfare indicators into an operational welfare assessment system: A bottom up approach. *Animal Science Supplementary paper 30*: 53-58.

Sandøe, P., L. Munksgaard, N.P. Bødsgård, & K.H. Jensen, 1997. How to manage the management factor – assessing animal welfare at the farm level. In: Livestock farming systems – more than food production. EAAP Publication No. 89. Proceedings of the fourth international symposium on the livestock farming systems, Foulum, Denmark 22-23 August 1996, Sørensen, J.T. (editor), Wageningen Pers, Wageningen. 221-230.

Stookey J.M. 1994 Is intensive dairy production compatible with animal welfare?. *Advances in dairy Technology* Volume 6. Proceedings of 1994 Western Dairy Canadian Dairy seminar. pp 209-219

Webster, A.J.F. (1993) The Challenge of Animal Welfare. In: World Conference on Animal Production. Edmonton, Alberta. pp. 513-524.

Wechsler B, Schaub J, Friedli K and Hauser R 2000. Behaviour and leg injuries in dairy cows kept in cubicle systems with straw bedding or soft lying mats. *Applied Animal Behavior Science* 69: 189-197

APPENDIX 1: QUESTIONNAIRE

Study questionnaire: Zero-grazed dairy cattle

Please fill this questionnaire to the best of your ability.

Farmer/user details

Location.....ward.....

Animal species.....Sex.....Age.....

Names of animals if any: present [] absent []

Observations

i) Body condition score; good [] fair [] poor [] very poor []

ii) Physical injuries on the animal

1. Skin

Wounds: type and location.....

Scars: present [] absent []

Swollen neck: present [] absent []

Alopecia at neck: present [] absent []

Lameness (location).....

2. Skeletal deformities

.....

iii) Condition of the feet

1. Well groomed.....

2. Overgrown hooves.....

3. Deformed.....

v). Animal treatment while feeding and milking

1. Lashing/beatings.....

2. Tail twisting.....

3. Shouting.....

4. Calling their names.....

viii).Quality of water given to the animals

Good..... Fair poor very poor.....

ix) Type of shelter: roofed shed with open sides [] roofed shed with closed sides [] closed boma [] other type (specify).....

x) Type of bedding material used: maize straw [] sawdust [] maize straws [] dry grass [] none [] others.....

xi) Drainage of slurry in the boma: well drained [] poorly drained [] full of slurry []

xii) Hygiene status of the boma and animals good [] poor [] very poor []

xii) Type of floor in the bomas

Concrete [] rough [] slippery [] Mud []

Questions

A. Are you familiar with the 5 freedoms of animal welfare: Yes.....No.....
If yes which ones are you familiar with
.....

B. What type of mating do you use:

A.I Yes.....No.....

Bull Yes.....No.....

B. Nutrition

i) What do the animals feed on?

ii) Do you water them immediately after feeding. Yes....., No.....

Qualify your answer.....

iii) What is the source of water for the cows?

iv) Do you provide them with mineral supplement? Yes.....No.....

Qualify your answer above.....

C. Sheltering

i) Are dairy cows provided with shelter? Yes.....No.....

Qualify your answer.....

ii) Do you provide bedding in their boma? Yes..... No.....

iii) How often do you change the bedding?

D. Health

i) What health problems do zero-grazed dairy cows face?

ii) How long do you take to respond to them?.....

iii) Who manages them when they are unwell?.....

iv) Do you milk the animals when they are unwell?.....

v) Do you deworm the animals?

Yes How often?.....

No Why not?

vi) Do you vaccinate them against common diseases?

No.....Why not?.....

Yes.....Who does it?.....

vii)How do you take care of ectoparasites?.....

viii) How often is this done?.....

ix) In your opinion, what are the challenges facing zero-grazed dairy cows in your area?.....

In your opinion, what are the solutions to the challenges?.....